Taking "Grazing" to the Next Level

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Since the late 1980's, producer awareness of pasture management has been increasing. A number of factors have brought this about. Mainly, economic conditions have forced producers to look at their bottom line and this has reflected the low returns from mismanagement of forages and pastures. Also, advancements in the technology of pasture management and improvement have made more intensive utilization of the forage resource more economically viable. Advances in equipment, especially fencing and water equipment, have also helped bring about the increased interest in better grassland management.

For the first few years, we observed rapid changes in grazing practices with more management intensive grazing systems being adopted by many producers. However, now we have reached a plateau in grazing standards. The level of progression has not continued upward with new management practices. This being the case, perhaps we need to step back and look at what we are doing right and how we can improve upon that to continue an upward spiral in grazing management.

Pasture Fertility

One of the first areas that I notice still under managed is pasture fertility. Soils should be limed and fertilized to produce reasonably high forage yields. Fertilizer practices improve forage quality by providing the nutrients needed to grow high quality forages. With perennial sod crops, it is practical to grow productive and persistent legumes-grass mixtures because legumes fix nitrogen for their growth and the growth of associated grasses.

All plants require 16 essential elements. Carbon, hydrogen, and oxygen come from water and air. The remaining elements come from the soil. Most soils in their native state are capable of providing enough of all nutrients except nitrogen, phosphorus, and potassium. Magnesium, calcium, and sulfur are required in amounts comparable to phosphorus, but are much more available in most soils than phosphorus. It is essential, for producers to develop a good soil testing and fertility program for their pastures. This will enable them to provide the nutrients needed to produce high quality forages for their animals.

Remember forage selection is a key part of any fertility decision. Forages differ in the minimum fertility level needed for persistence and productivity. Legumes require higher pH, phosphorus and potassium levels than most grasses.

Table 1. Effect of Forage Species and Fertility Levels on Pasture Grazing Days and Carrying Capacity, Ohio State University			
Forage Species	**Soil Fertility**	**Available Grazing Days**	**Acres per cow/calf**
Bluegrass	Low	59	3.13
Bluegrass Orchardgrass	Low	89	2.08
Bluegrass Orchardgrass	Moderate	106	1.74
Bluegrass Orchardgrass	Good + 130 lb N	104	1.00
Orchardgrass Alfalfa	Moderate	189	0.97

Grazing Efficiency

There is no magic number of paddocks that a producer must have for a successful controlled grazing system. The optimum number of paddocks will vary with species due to resistance to grazing, regrowth habit, and economic potential. The ideal system would have grazing animals move daily to a fresh paddock. However, this ideal system is often difficult to sell too many producers. The advantages of such a system include minimal feed wastage, very high quality feed each day, reduction of parasite infestations, rapid uniform grazing, and many more. Most producers quickly see the advantage of more paddocks and move in that direction. The objective of increased paddock number is basically to raise stock density to produce uniform grazing.

Table 2. Levels of Utilization	
Length of grazing period	**Expected % utilization**
1 day or less	80
3-4 days	70
6-8 days	60
10 – 14 days	50
> 20 days or longer	40 or less

FSRC, University of Missouri

All of this is obviously tied to forage availability per acre. A more productive crop will support a higher stock density than will a less productive crop. The next question is how to determine what the desired stock density is. We must know three factors to

determine this: 1) what is the daily feed requirement, 2) what is the forage availability, and 3) what is the desired utilization rate. Generally, as stocking rate is increased selectivity of grazing decreases.

Utilization rate is one way of figuring harvest efficiency. The most desirable harvest efficiency is 100% without damaging the stand. This is essentially impossible due to the excretory habits of livestock and the fact that they walk on their dinner plate. Of the forage that grows in the field, 15-25% will have to remain in residual dry matter (RDM) or stubble, as it is usually called. The amount will depend upon the species being grazed. Alfalfa requires very little residual because stored energy from the roots will support new regrowth. Indiangrass will require a higher percentage of RDM because the primary carbohydrates (CHO) storage site is the lower stem and it is also desirable to leave some active leaf area below grazing height. The longer period of time livestock are allowed to remain on a paddock the more of it they will foul by manure and trampling. Utilization rate is inversely related to length of stay. If you want to harvest 75% of the standing crop, the animal better be out there no more than a few hours. If you are content with 50% utilization, then they might stay a week to 10 days. For continuous grazing, the generally accepted level of utilization is 20-35%. The longer the length of stay, the lower stock density will be. It is clear that utilization is very closely tied to stock density.

The actual number of paddocks required for a particular grazing cycle is determined by the necessary rest interval required for that particular pasture mix under the current environmental conditions and by the maximum number of days that animals should be left on a paddock. Typically the CHO replenishment cycle in forage plants takes 20-30 days, therefore, this is the range in rest interval we should be generally considering. Under good growing conditions, the shorter time frame would be required. In midsummer, the longer time period is required to reach a state of positive CHO balance due to high respiration rates. The implication is that fewer paddocks or more livestock are needed at certain times of the year. For most producers, the paddocks not needed for grazing can be harvested as hay or haylage. The greater the number of paddocks the more fine tuned the proportion of grazed acres to hayed acres can become. One aspect to bear in mind though is that one 20-acre tract can be harvested more efficiently than five 4 acre tracts. The use of temporary fencing can facilitate both ends. Remove the first harvest of the 20 acres as hay in a single block and then erect temporary fencing for controlling grazing on the regrowth.

Forage Intake and Animal Response

Research on forage intake indicates that intake of forages account for about 75 percent of the difference in animal performance on various forages, and digestibility accounts for about 25 percent. Voluntary forage intake from pasture is extremely important because without adequate forage consumption by livestock, nutrient intake will not be sufficient to support the desired performance. In reality, first grazers should be ruminants with

high nutrition demands such as high producing milk cows or fattening steers or lambs. Whereas, last grazers could be dry cows or animals with lower nutritional demands.

Table 3. Herbage on offer at beginning and ending of grazing periods of differing lengths, forage intake of grazing beef cows, and temporal utilization rate

Length of Temporal Grazing Period Utilization	Beginning Forage	Ending Forage	Dry Matter Intake	Percent
Days	Lbs/Acre	Lbs/Acre	Lbs/hd/day	%
2	1994	1112	43.9	42
3	2165	1141	36.9	47
4	2231	1233	28.4	45
5	2521	1401	24.8	44
6	2511	1345	21.5	46
7	2984	1427	24.7	52

J. Gerrish, F.A. Martz, V.G. Tate and R.E. Morrow, University of Missouri, 1998

Multi Species Grazing

As forage producers focus on better utilization of valuable forages, they might want to consider multi-species grazing. Improved forage utilization through a more diverse mix of livestock has shown some economic advantages.

Multi species grazing can offer several advantages. For example, cattle are less selective when grazing than sheep or goats. Cattle prefer grasses and legumes over other plants, whereas sheep and goats are much more likely to eat weeds and brush. Sheep prefer forbs to grass and goats have a preference for browsing on brush and shrubs, and then broad-leaved weeds.

Cattle will tend to graze taller plants than sheep. Sheep will also graze near cattle manure deposits, while cattle will avoid these spots. This will result in more uniform grazing of pastures. This will improve carrying capacity and pasture productivity resulting in increased gains per acre from the pasture.

Table 4. Influence of sheep and cattle grazing alone and together on body weight and gain by cows and ewes						
	Grazing Treatment					
Item	Cows[b] Grazed Alone	Cows[b] Grazed With Sheep	SEM	Grazed Alone	Ewes[b] Grazed with Cattle	SEM
	kg	kg		kg	kg	
Initial BW	491[c]	481	17	69[c]	69	3
Final BW	515	519	15	68[c]	71	2
Total Gain	24[c]	37	9	-1.1[cd]	1.7	2

[a]Average over 1988, 1989, and 1990
[b]Each value for cows and sheep is the mean of 54 animals
[c]Effect of year (P<0.5).
[d]Effect of treatment (P<0.5)
A.O. Abaye, V.G. Allen and J.P. Fontenot-Influence of grazing cattle and sheep together and separately on animal performance and forage quality, J. ANIM SCI, 1994. 72: 1013-1022

Extending the Grazing Season

Feed costs represent the major cost in most livestock production systems. Typically, the cost of supplying nutrients to ruminant livestock is much greater using harvested feedstuffs as opposed to grazing pastures or crop residues. The primary function of a grassland farm is to convert solar energy to marketable livestock products in the most efficient manner. The fewer steps between the animal product and the solar energy, typically, the more economically efficient the production systems will be.

Providing grazable forage, in a cost-effective manner to the animal, for as many days of the year as possible should be the goal of the grazing manager. We generally think of winter as the time when most harvest forages are fed. However in much of the country, we should be looking at the spring time and in mid-summer drought as times that we can also extend the grazing season.

Extending Spring Grazing

Practices that we can use to extend the spring grazing season include: 1) applying nitrogen to a limited number of paddocks for early grazing, 2) use of winter annuals such as cereal rye, wheat or triticale, 3) use of annual or biannual ryegrass, 4) use of growth promotion for forages, 5) high density grazing and 6) early maturing cool season grasses.

Table 5. Growth Promotion –RyzUp Smart Grass Demonstration (1 year Data)				
Plot	**Rates**	**Av. Yield**	**Range**	**Range**
			Low	**High**
Orchard Grass				
	0.3 Oz	1,092	893	1,274
	0.6 Oz	955	872	1,024
	1.0 Oz	1,244	843	1,076
	Check	980	843	1,076
Endophyte Free Fescue				
	0.3 Oz	958	878	1,001
	0.6 Oz	938	910	988
	1.0 Oz	1,266	1,109	1,406
	Check	766	691	828
Max Q Novel Fescue				
	0.3 Oz	761	672	869
	0.6 Oz	774	688	831
	1.0 Oz	1,1081	886	1,334
	Check	763	755	859

University of Illinois Dudley Smith Farm, spring, 2011, E. Ballard and G. Letterly

Extending Summer Grazing

For the summer drought period we can extend grazing by: 1) incorporating legumes into cool season grasses, 2) use of summer annuals like Pearl Millet, Sorghum Sudangrass or Sudangrass hybrids, 3) grazing legumes such as alfalfa and 4) grazing different types of corn.

Table 6. Importance of Legumes in Seeding Mixture								
Species	**2008 CP%**	**2009 CP%**	**2010 CP%**	**2011 CP%**	**2008 TDN%**	**2009 TDN%**	**2010 TDN%**	**2011 TDN%**
Orchardgrass	20.7	24.2	22.9	20.7	63.4	68.0	67.6	63.0
Orchardgrass & No Clover	19.1	21.9	19.2	15.1	61.5	64.8	60.1	57.8
Endophyte Free Fescue	20.2	21.2	19.4	19.1	63.3	64.9	63.8	61.2
Endophyte Free Fescue & No Clover	18	19.1	15.4	15.3	61.1	63.1	58.7	56.9
Max Q Fescue	18.8	21.2	20.0	20.9	59.7	64.0	64.9	62.4
Max Q Fescue & No Clover	18.2	16.3	15.0	16.0	58.3	61.7	57.9	56.1

University of Illinois-Dudley Smith Farm, E. Ballard, 5 Lbs. of Red Clover and 1 Lb. of White Clover Frost Seeded Annual in late winter on Orchard and Endophyte Free Fescue, and 2 Lbs. White Clover Frost Seeded Annually on Max Q Fescue. Good Stand of Clover in all paddocks when trial test started in 2008. Paddocks sampled monthly from April thru November.

Extending Fall and Winter Grazing

Several strategies can be employed to supply forage into the fall or early winter and effectively extend the grazing season by 60 to 90 days, thus reducing the need for stored feeds. These strategies can be categorized into three major groups: 1) stockpiling (conserving cool-season forages in late summer for use in the fall and winter), or 2) utilizing forage crops that continue to grow into the fall, early winter and early spring, and 3) grazing crop residues.

Table 7. Daily and seasonal forage costs for alternative wintering strategies at typical yields, costs, and period of use based on 100-cow autumn-calving herd.

Winter feeding period from Dec 1 to April 10

Forage Source	Hay	Cornstalks	Stockpiled tall fescue	Ryegrass + cereal rye
$/cow/day	$1.32	$0.05	$0.31	$0.61
Days of use	130 hay	60 stalks 70 hay	90 graze 40 hay	90 graze 40 hay
Wintering cost	$172	$122	$70	$108

SOURCE: Jim Gerrish, University of Missouri.

Summary

Each day an animal is grazing we are looking at a cost per head per day around 30 cents per day to 70 cents per day. Feeding hay will cost at least $1.25 per head per day or more depending on the type of hay. Management intensive grazing with the goal of trying to graze year around can provide the producer an opportunity to increase the profit potential of their livestock enterprise. Each day you extend grazing is taking a big step to the next level.

References:

Don Ball, Ed Ballard, Mark Kennedy, Garry Lacefield, Dan Undersander. Extending Grazing and Reducing Stored Feed Needs, 2008, Forage-Animal Management Systems, Roy E. Blaser and Colleagues, Virginia Polytechnic Institute and State University, 1986

A. O. Abaye, V. G. Allen and J. P. Fontenot**,** Influence of grazing cattle and sheep together and separately on animal performance and Forage Quality *J ANIM SCI* 1994, 72:1013-1022.

M.K. Neary, K.D. Johnson, K.S. Hendrix and D. Trotter Departments of Animal Sciences and Agronomy Purdue University, 1992 Integrated Livestock and Forage Production through Multi-species Grazing: A Progress Report

Missouri Grazing Manual, Jim Gerrish and Craig Robert, University of Missouri, 1999.